



# **RANI CHANNAMMA UNIVERSITY**

## **BELAGAVI**

**REVISED CURRICULUM FRAMEWORK FOR  
UNDER GRADUATE COURSE**

**STRUCTURE & SYLLABUS OF BACHELOR OF SCIENCE**

**STATISTICS**

**1<sup>ST</sup> TO 2<sup>ND</sup> Semesters**

**w.e.f.**

**Academic Year 2024-25 and Onwards**

Submitted by

Chairman,  
Board of Studies (UG),  
Bachelor of Science,  
Rani Channamma University, Belagavi.

## B.Sc. Program with Statistics Subject

B.Sc.: Statistics as one of the optional subject revised syllabus (w.e.f. 2024-25 and onwards)								
Sem	Part	Paper Code	Title of Paper	Hours/ Week	Marks			Subject Credits
					IA	Exam	Total	
I	Part - 1 DSC	STSDSCT 1.1	Descriptive Statistics	4	20	80	100	3
		STSDSCP 1.1	Practicals-I	3	10	40	50	2
	<b>Total : Hours / Credits</b>			<b>7</b>			<b>150</b>	<b>5</b>
II	Part - 1 DSC	STSDSCT 2.1	Bivariate Data Analysis and Standard Theoretic Distributions	4	20	80	100	3
		STSDSCP 2.1	Practicals-II	3	10	40	50	2
	<b>Total : Hours / Credits</b>			<b>7</b>			<b>150</b>	<b>5</b>

### B.Sc. Program with Statistics Optional Subject

(T: Theory, P: Practical, CC/EA: Co-curricular/Extension Activities

AECC: Ability Enhancement Compulsory Course, DSC: Discipline Specific Course

DSE: Discipline Specific Elective, SEC: Skill Enhancement Course)

**Note: Duration of examinations is 03 Hrs for 80 Marks theory and 02 hrs for 40 marks theory. For practical's duration of examination is 03 Hrs.**

## B.Sc I Semester-Statistics

**Paper Code:** STSDSCT1.1

**Teaching Hours:** 4 Hrs / Week

**Teaching Hours:** 60Hrs

**Paper Title:** Descriptive Statistics

**Marks:** Theory-80+IA-20

**Credits:** 03

### UNIT I

Introduction: Definition and scope of Statistics, concept of population and sample. Data - qualitative and quantitative, variables and attributes. Measurement scales - nominal, ordinal, interval and ratio. Presentation - classification & tabulation, frequency distribution. Diagrams - simple, multiple, subdivided and percentage. Graphs - histogram, frequency polygon, frequency curve, ogives.

**12Hours**

### UNIT II

Measures of Central tendency: Purpose of measures of location, definition of A.M, G.M, H.M & their properties (with proof), median and mode. Partitioned values - quartiles, deciles and percentiles.

**12Hours**

### UNIT III

Measures of Dispersion: Absolute and relative measures - range, quartile deviation, mean deviation, standard deviation and coefficient of variation. Moments, skewness and kurtosis.

**12Hours**

### UNIT IV

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of probability - classical, statistical, and axiomatic. Conditional probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

**12Hours**

### UNIT V

Random variables & Mathematical Expectation: discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations and properties of random variables, univariate transformations with illustrations. Two dimensional random variables: discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f., and c.d.f., independence of variables, bivariate transformations with illustrations.

**12Hours**

#### Books for Reference:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. Gupta S.C and Kapoor V.K.: Fundamentals of Mathematical Statistics- Sultan Chand & Sons publications.
5. Hogg .R.V. and Craig A.T (1978): Introduction to Mathematical Statistics. Amerind Publishing Company.

## B.Sc I Semester-Statistics

**Paper Code:** STSDSCP1.1

**Paper Title:** PRACTICALS

**Practical Hours:** 3 Hrs / Week

**Marks:** Practical-40+IA-10

**Credits:** 02

### List of Practicals

1. Construction of frequency distribution and graphical representation.
2. Measures of central tendency-I Computation of AM, GM and HM
3. Measures of central tendency-II Computation of positional averages and partition values.
4. Measures of dispersion – I
5. Measures of dispersion – II
6. Moments, skewness and kurtosis for a frequency distribution.
7. Probability – I
8. Probability – II
9. Random variables for univariate.
10. Random variables for bivariate.

## B.Sc II Semester- Statistics

**Paper Code:** STSDSCT2.1

**Paper Title :** Bivariate Data Analysis and Standard theoretical Distributions.

**Teaching Hours :** 4 Hrs/Weeks

**Marks :** Theory- 80 + IA -20

**Teaching Hours :** 60Hrs

**Credits :** 03

### UNIT I

Mathematical Expectation of single and bivariate random variables, its properties. Addition and multiplication theorem of expectation. Moments and Cumulants. MGF and CGF - their properties, conditional expectation, variance, covariance, mean and variance of linear combination of random variables.

**12Hours**

### UNIT II

Bivariate data: Definition, scatter diagram, simple, Karl Pearson's correlation coefficient, Spearman's Rank correlation coefficient, Properties, concept of errors, principles of leastsquares, simple linear regression and its properties, fitting of regression lines, coefficient of determination.

**12Hours**

### UNIT III

Multivariate (Trivariate) Data Analysis: Multiple linear regression, multiple and partial correlation coefficients. Residuals and their properties.

**12Hours**

### UNIT IV

Discrete probability Distributions: Bernoulli, Binomial, Poisson, Negative Binomial, Geometric and Uniform, distributions - definition, mean, variance and m.g.f., c.g.f and moments upto fourth order only. Hyper geometric distribution: definition, mean and variance. Recurrence relation for probabilities and moments of Binomial and Poisson distributions. Approximations of binomial, negative binomial and hyper geometric distributions.

**12Hours**

### UNIT V

Continuous Probability Distributions: Uniform, Gamma, Beta, Exponential, Normal and Cauchy distributions - Mean, variance, moments, MGF and Properties.

**12Hours**

### Books for reference:

1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi.
4. Gupta S.C and Kapoor V.K.: Fundamentals of Mathematical Statistics- Sultan Chand & Sons

**B.Sc II Semester- Statistics**

<b>Paper Code:</b> STSDSCP2.1	<b>Paper Title:</b> PRACTICALS
<b>Practical Hours:</b> 3 Hrs / Week	<b>Marks:</b> Practical-40+IA-10
	<b>Credits:</b> 02

**List of Practicals**

1. Bivariate distributions: Computation of marginal and conditional distributions.
2. Correlation: Computation of Karl Pearson's correlation coefficient,
3. Correlation: Computation of Rank correlation coefficient.
4. Fitting of regression equations.
5. Partial correlation
6. Multiple correlation.
7. Fitting of Poisson distributions.
8. Fitting of Binomial distributions.
9. Fitting of normal distribution.

## **Question Paper Pattern in Statistics (Optional) for all semester**

### **Section A**

- I. Answer any **10** questions out of **12** questions (Q. No. 1 to 12)  
10x2 = 20 Marks.

### **Section B**

- II. Answer any **4** questions out of **6** questions (Q. No. 13 to 18)  
4x5 = 20 marks.

### **Section C**

- III. Answer any 4 questions out of **6** questions (Q. No. 19 to 24)  
4x10 = 40 marks.

**Total = 80 marks**

**RANI CHANNAMMA UNIVERSITY, BELAGAVI**



**THE COURSE STRUCTURE & SYLLABUS  
UNDER GRADUATE BACHELOR OF SCIENCE**

**STATISTICS**

**III and IV Semesters**

**w.e.f.**

**Academic Year 2025-26 and Onwards**

**Submitted By**

**Chairman  
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Rani Channamma University, Belagavi**

## COURSE STRUCTURE FOR B.SC.PROGRAMME

SEM	Subjects	Teaching Hours Per Week	Duration of Exam	Marks			Credits
				IA	Exam	Total	
III	Major 1Theory	4	3	20	80	100	3
	Major 1Practical	4	4	10	40	50	2
	Major 2Theory	4	3	20	80	100	3
	Major 2Practical	4	4	10	40	50	2
	Major 3Theory	4	3	20	80	100	3
	Major 3 Practical	4	3	10	40	50	2
	Language-I	4	3	20	80	100	3
	Language-II	4	3	20	80	100	3
	Elective 1- Statistical Methods	3	2	10	40	50	2
	C-3- EVS	4	2	10	40	50	2
		Total					<b>750</b>

## COURSE STRUCTURE FOR B.SC.PROGRAMME

SEM	Subjects	Teaching Hours Per Week	Duration of Exam	Marks			Credits
				IA	Exam	Total	
IV	Major 1Theory	4	3	20	80	100	3
	Major 1Practical	4	4	10	40	50	2
	Major 2Theory	4	3	20	80	100	3
	Major 2Practical	4	4	10	40	50	2
	Major 3Theory	4	3	20	80	100	3
	Major 3 Practical	4	3	10	40	50	2
	Language-I	4	3	20	80	100	3
	Language-II	4	3	20	80	100	3
	Elective II- Population Studies	3	2	10	40	50	2
	Skill I - Data Analysis with SPSS	4	2	10	40	50	2
		Total					<b>750</b>

## **B.Sc.Program III Semester**

**B.Sc.Program with Statistics Major Subject**

(T:Theory,P:Practical)

**Note: Duration of examinations is 03 Hrs for 80 Marks theory**

**For practical's duration of examination is 03 Hrs.**

**Regulations and Syllabus**  
**For**  
**STATISTICS**  
**In**  
**Three Year B. Sc. Course (2025-26)**

**Regulation and Scheme of Instructions:**

Regulations for governing three years semesterized Bachelor degree Programme of Rani Chennamma University, Belagavi, in Statistics major subject with effect from academic year 2025-2026.

**I. Goals and Objectives:**

The following aims have been kept in view while designing the syllabus of Bachelor's programme (B.Sc.) in Statistics as one of the major subject.

1. To create an aptitude and bring statistical awareness among the students.
2. To train promising learners to teach Statistics effectively at various level in the educational institutions.
3. To provide adequate Statistical knowledge and skills as required for the competitive examination.
4. To enrich and enhance analytical skills through Statistical techniques.
5. To make the subject student friendly, socially relevant and to cultivate research culture among the students.

**II. Admission criteria:**

Any candidate who have passed PUC/10+2 with any subjects are eligible to choose Statistics as one of the major subject at the under graduate course. The other rules for admission are as per the university and government notifications from time to time.

**III. Medium of Instruction:**

The medium of instruction will be in English.

#### **IV. Attendance:**

A minimum of 75% of attendance in each semester is compulsory.

#### **V. Scheme of Instruction:**

1. The M.A./M.Sc./M.Stat. Master degree holders in Statistics can only teach Statistics major subject at UG level.
2. Statistics is an major subject at UG level which consists of six semesters. There will be one theory paper for 100 marks and one practical paper for 50 marks each semester . The duration of teaching hours will be 4hours per week for theory paper and 4hours for practical.

#### **VI. General Pattern of Theory Question Paper:**

1. Theory course shall carry 100 marks of which 80 marks allotted for semester end examination and 20 marks for internal assessment.
2. Practical shall carry 50 marks of which 40marks allotted for semester end examination and 10 marks for practical internal.

## B.SC.SEMESTER III

<b>Title Of The Paper: Theory Of Sampling and Statistical Inference - I</b>	<b>Total Marks: Th-80+ IA-20=100</b>
<b>Paper code BSCSTAT-T3</b>	<b>TeachingHours:60Hours</b>
<b>Teaching Hours: 4 Hours/Week</b>	<b>Credits:03</b>

**Course Outcomes (COs): At the end of the course students will be able to:**

**CO1:** Understand the principles underlying sampling as a means of making inferences about a population.

**CO2:** Understand the difference between probability and non probability sampling.

**CO3:** Understand different sampling techniques.

**CO4:** To learn to estimate population parameters from a sample.

**CO5:** To find estimators using different methods of estimation and compare estimators.

**CO6:** To carry out statistical inference using different tests of hypotheses under different scenarios.

**CO7:** To carry out the interval estimation to know the probable range of the parameters.

Unit		60hrs/ sem
Unit-I	<b>Introduction to Sampling, and Simple Random Sampling:</b> Concept of population and sample. Need for sampling, Complete Enumeration versus Sample Surveys, Merits and Demerits, Non – Probability and Probability Sampling, Need and illustrations. Use of random numbers, Principal steps in sample survey. Requisites of a good questionnaire. Pilot surveys, Sampling and non – sampling errors, Description of SRS, simple random sampling according to with and without replacement procedures, Unbiased estimates of population mean and totals, Derivation of sampling variances, standard errors of estimators, Simple random sampling for proportions, derivation of variances of estimators and their estimation, determination of sample size for estimation of population mean and population proportion, Merits and demerits of Simple random sampling.	15hrs
Unit-II	<b>Stratified sampling and systematic sampling:</b> Stratification and its benefits; basis of stratification, Technique, estimates of population mean and total, variances of these estimates, proportional, optimum allocations, Neyman's allocation, allocation with cost functions and their comparison with SRS. Practical difficulties in allocation, derivation	15hrs

	<p>of the expressions for the standard errors of the above estimators when these allocations are used, estimation of gain in precision, post stratification and its performance. Systematic Sampling: Linear systematic sampling Technique; estimates of population mean and total, variances of these estimates (<math>N = n \times k</math>). Comparison of systematic sampling with SRS and stratified sampling in the presence of linear trend and corrections.</p>	
Unit-III	<p><b>Point Estimation:</b> Concepts of the terms: Parameter, Estimator, Estimate and Standard Error of an estimator. Unbiasedness, Mean squared error as a criterion for comparing estimators. Relative efficiency, Most efficient estimator, Minimum variance unbiased estimator (MVUE). Consistency: Definition and criteria for consistency. Proof of Sufficient condition for consistency using Chebyshev's inequality. Sufficient statistic, Fisher – Neyman criterion and Neyman–Factorization theorem (without proof), Measure of information – Fisher information function. Cramer–Rao inequality (with proof) and its applications in the construction of minimum variance unbiased estimators. Methods of Estimation: Maximum Likelihood and Moment estimation methods. Standard examples from theoretical distributions, Illustration for non uniqueness of MLE's. Properties of MLE Estimator and MME Estimator. Examples illustrating properties of MLE.</p>	15hrs
Unit-IV	<p><b>Order Statistics:</b> Definition of ordered statistic and their distributions, Derivation of first order statistic, highest order statistic, <math>r</math>th order statistics, joint distribution of order statistics and their derivations, simple examples to obtain the distributions of order statistics.</p> <p><b>Interval Estimation:</b> Meaning of confidence interval and pivotal quantity, Confidence interval based on pivotal quantity. Confidence coefficient. Confidence intervals for mean, difference between means for large and small samples, Confidence intervals for variance and ratio of variances under normality. Large sample confidence intervals for proportion and difference between two proportions and correlation coefficient.</p>	15hrs

### Books for Reference:

1. Cochran, W.G. (1977). Sampling Techniques. Wiley Eastern Ltd., New Delhi.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B.: Fundamentals of Statistics Volume I and II. The World Press Private Limited, Calcutta.
3. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
4. Gupta, S.C.: Fundamentals of Statistics, Himalaya Publishing House, Bombay.
5. Kalyan Kumar Mukherjee: Probability and Statistics, New Central Book Agency (P) Ltd., Calcutta.
6. Lindgren: Introduction to Probability & Statistics, MacMillan Publishers.
7. Mukhopadhyaya, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd., Calcutta.
8. R.V. Hogg, E. A. Tannis, Probability and Statistical Inference: Third Edition; Collier McMillan Publishers.
9. Robert V. Hogg and Allen T. Craig: Introduction to Mathematical Statistics (Fifth Edition), Pearson Education Inc, New Delhi.
10. Rohatgi, V.K. and Saleh, A.K. MD. (2001). *An Introduction to Probability and Statistics*, 2nd edition. John Wiley & Sons, Inc., New York

### PRACTICALS

<b>Title Of The Paper: Theory Of Sampling and Statistical Inference - I</b>	<b>Total Marks: TH-40+ IA-10=50</b>
<b>Paper code BSCSTAT-P3</b>	<b>Teaching Hours: 40 Hours</b>
<b>Teaching Hours: 4 Hours/Week</b>	<b>Credits: 02</b>

1. To select a simple random sampling with and without replacement procedure from a finite population using Random Number Tables.
2. Problems on Simple Random Sampling.
3. Problems on Stratified Random Sampling.
4. Problems on Systematic Random Sampling.
5. Computation of mean square errors of estimators and comparison.
6. Problems on Maximum Likelihood Estimation.
7. Problems on Method of Moment Estimation.
8. Construction of Confidence Intervals for single mean and difference of two means.
9. Construction of Confidence Intervals for single proportion and difference of two proportions.
10. Construction of Confidence Intervals—for single variance and ratio of two variances.

## Elective- I : STATISTICAL METHODS

### Course Outcomes(CO)

Upon the completion of this course students should be able to:

**CO1.**Frame and formulate management decision problems.

**CO2.**Understand the basic concepts underlying quantitative analysis.

**CO3.**Usesound judgment in the applications of quantitative methods to management decisions.

### STATISTICAL METHODS

<b>Title Of The Paper: Statistical Methods</b>	<b>Total Marks: TH-40+ IA-10=50</b>
<b>Paper code BSCSTAT-E1</b>	<b>TeachingHours:45 Hours</b>
<b>Teaching Hours: 3Hours/Week</b>	<b>Credits:02</b>

<b>Unit-I:Correlation</b>	<b>12hrs</b>
CorrelationAnalysis:MeaningofCorrelation:simple,multipleandpartial;linearand non-linear, Correlation and Causation, Scatter diagram, Pearson’s co-efficient of correlation;calculationandproperties(Proofnotrequired).CorrelationandProbable error;Rank Correlation.	
<b>Unit-II:RegressionAnalysis</b>	<b>11 hrs</b>
Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Propertiesofregressioncoefficients;Relationshipbetween CorrelationandRegressioncoefficients;StandardErrorofEstimateanditsusein interpretingthe results.	
<b>Unit-III:Index Numbers</b>	<b>11hrs</b>
Definition, Problems involved in the construction of index numbers, methods of constructingindex numbersof pricesandquantities,simpleaggregateandpricerelatives method,weightedaggregateandweightedaverageofrelativesmethod,importanttypes ofweightedindexnumbers:Laspeyre’s,Paasche’s,Bowley’s,Marshall-Edgeworth, Fisher’s,methodofobtainingpriceandquantityindexnumbers,testsconsistencyof	

index numbers, time reversal test and factor reversal test for index numbers, Uses and limitations of index numbers. Consumer price index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate – CPI and GNP Deflator.

**Unit-IV: Time Series Analysis**

**11 hrs**

Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time series: Secular trend, method of moving averages, least squares method – linear, quadratic, exponential trend fittings to the data. Seasonal variation - definition, illustrations, measurements, simple average method, ratio to moving average method, ratio of trend method, link relative method, Cyclical variation - definition, distinction from seasonal variation, Irregular variation - definition, illustrations.

**Books for References:**

- . Levin, Richard, David S. Rubin, Sanjay Rastogi, and H M Siddiqui. Statistics for Management. 7th ed., Pearson Education.
- . David M. Levine, Mark L. Berenson, Timothy C. Krehbiel, P. K. Viswanathan, Business Statistics: A First Course, Pearson Education.
- . Siegel Andrew F. Practical Business Statistics. McGraw Hill Education.
- . Gupta, S.P., and Archana Agarwal. Business Statistics, Sultan Chand and Sons, New Delhi.
- . Vohra N.D., Business Statistics, McGraw Hill Education.
- . Murray R Spiegel, Larry J. Stephens, Narinder Kumar. Statistics (Schaum's Outline Series), Mc-Graw Hill Education.
- . Gupta, S.C. Fundamentals of Statistics. Himalaya Publishing House.
- . Anderson, Sweeney, and Williams, Statistics for Students of Economics and Business, Cengage Learning.

## B.SC. SEMESTER IV

<b>Title Of The Paper: Exact Sampling Distributions and Statistical Inference-II</b>	<b>Total Marks: Th-80+ IA-20=100</b>
<b>Paper code BSCSTAT-T4</b>	<b>TeachingHours:60Hours</b>
<b>Teaching Hours: 4 Hours/Week</b>	<b>Credits:03</b>

### Course Outcomes(COs)

At the end of the course the student should be able to:

1. To understand and derive the Chi-square,t, and Fdistributions, along with their properties,moments, and interrelationships, and apply them to theoretical and practical examples.
2. To comprehend the fundamentals of hypothesis testing, including critical concepts like Type I and II errors,power,and level of significance,and apply standard large sample tests ( $Z,\chi^2,t,F$ )to real data.
3. To formulate and conduct Likelihood Ratio Tests (LRT) and verify Monotone Likelihood Ratio (MLR) properties for deriving UMP tests in one-parameter families.
4. To demonstrate the need for non-parametric tests, differentiate them from parametrictests, and apply various non-parametric tests such as the Sign test, Wilcoxon signed-rank test, Kolmogorov-Smirnov test, Runs test, Mann-Whitney test, and others for different hypotheses and data structures.

Unit		60hrs/ sem
Unit-I	<p><b>Chi-Square, t and F Sampling Distributions:</b> Chi-square Distribution: Definition, Derivation of Chi-distribution by Moment Generating Function method, Properties, Moments, Recurrence relation for moments about origin and mean, limiting form of Chi- distribution. Independence of sample mean and sample variance in random sampling from a normal distribution, Theoreticalexamples,Definitionofstudentst–variateandFisher’sst–variate, Derivationof students t – distribution, Moments andRecurrence relationfor t – distribution, Limiting form of t – distribution, Theoretical examples. Snedecor’s F – distribution: Definition, Derivation of F - distribution, Properties,Momentsandrecurrence relationformoments,Interrelationship between,Fand<math>\chi^2</math> distributions,Theoreticalexamples.</p>	15hrs

Unit-II	<p><b>Tests of Significance and Testing of Hypothesis:</b> Definitions of some important terms: Statistical Hypothesis, Simple &amp; Composite, Null and Alternative hypothesis, Critical Region, Type I and Type II errors, Level of Significance, Power function and Power of the test, One tailed and Two tailed tests, Z test, Large sample test for mean and difference of means, Proportion and difference of proportions. Applications of <math>\chi^2</math>, t and F distributions, Definitions of Most powerful test, Uniformly most powerful test. Statement and proof of Neyman-Pearson Lemma and its use in the construction of most powerful test, Standard examples for computation of Type I and Type II errors and Power of the test. Standard examples for NP lemma to determine most powerful Critical Region for one sided and two sided alternatives, and for Power Curves. Idea of randomized and non-randomized tests and critical function.</p>	15hrs
Unit-III	<p><b>Likelihood Ratio Test &amp; MLR property:</b> Likelihood ratio tests (LRT). Large sample approximations to the distribution of the likelihood ratio statistics (without proof). LRT for single mean for normal case (large and small samples). Definition of a monotone likelihood ratio property, verification of the property for some standard distributions for existence of one sided UMP tests.</p> <p><b>Sequential Testing:</b> Need for sequential tests, Wald's SPRT, Graphical procedure of SPRT, Determination of stopping bounds, Construction of SPRT of strength <math>(\alpha, \beta)</math> for Binomial, Poisson, Normal and Exponential distributions. Approximate expressions for OC and ASN functions for Binomial, Poisson and Normal distributions. Difference between SPRT and NP-test. Merits and demerits of SPRT.</p>	15hrs

Unit-IV	<b>Non –Parametric tests:</b> Need for Non-Parametric Tests, Advantages and Dis-advantage of non-parametric methods over parametric methods. Assumptions in non-parametric methods. Sign test for quantiles, Sign test based on paired observations, Wilcoxon signed rank test for one sample and paired samples. Comparison of the sign-test and Wilcoxon signed– rank test, Kolmogorov – Smirnov one-sample test, Comparison of it with chi-square test, Wald-Wolfowitz runs test, Median test and Mann-Whitney-Wilcoxon –test for two sample problems, Run test for randomness, Test for independence based on Spearman’s rank correlation coefficient.	15hrs
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**Books for Reference:**

1. Abraham Wald: Sequential Analysis, John Wiley & Sons, New York.
2. Goon, A.M., Gupta, M.K. and Dasgupta, B.: Fundamentals of Statistics Volume I and II. The World Press Private Limited, Calcutta.
3. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
4. Randles, R.H. and Wolfe, D.A.: Introduction to the Theory of Non-parametric Statistics, John Wiley & Sons, New York.
5. Ray & Sharma: Mathematical Statistics, Ram Prasad & Sons, Agra.
6. Robert V. Hogg and Allen T. Craig: Introduction to Mathematical Statistics (Fifth Edition), Pearson Education Inc, New Delhi.
7. Rohatgi, V.K.: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi.
8. Sidney Siegel: Nonparametric Statistics, for behavioral sciences, International Student Edition, McGraw Hill Ltd, India.

## PRACTICALS

<b>Title Of The Paper: Exact Sampling Distributions and Statistical Inference-II</b>	<b>Total Marks: TH-40+ IA-10=50</b>
<b>Paper code BSCSTAT-P4</b>	<b>TeachingHours:40 Hours</b>
<b>Teaching Hours: 4Hours/Week</b>	<b>Credits:02</b>

1. Applications of Chi-square distribution-test for variance and independence of attributes and Goodness of fit.
2. Applications of Student's t-distribution.
3. Applications of Snedecor's F-distribution
4. Large Sample Tests for mean and difference of means.
5. Large Sample Tests for proportion and difference of proportions.
6. Testing of Statistical Hypothesis-I-Problems on computation of Type-I, Type-II errors and power function.
7. Testing of Statistical Hypothesis-II – Computation of Most powerful tests and Power curves.
8. Sequential Probability Ratio Test for discrete and Continuous distributions.
9. Non-Parametric Tests for single sample (sign test, Wilcoxon signed rank test), Randomness test, Kolmogorov-Smirnov goodness of fit.
10. Non-Parametric Tests for two independent samples (sign test, Wilcoxon signed rank test, median test, Wilcoxon Mann-Whitney test), Run test, Rank Correlation Coefficient.

## Elective-II: POPULATION STUDIES

At the end of the course the student should be able to:

**CO1:** Study the concepts of Vital Statistics, sources of data, different measures of Fertility, Mortality and migration.

**CO2:** Understand the Growth rates-GRR and NRR and their interpretations.

### POPULATION STUDIES

<b>Title Of The Paper: Population Studies</b>	<b>Total Marks: TH-40+ IA-10=50</b>
<b>Paper code: BSCSTAT-E2</b>	<b>Teaching Hours: 45 Hours</b>
<b>Teaching Hours: 3Hours/Week</b>	<b>Credits: 02</b>

<b>Unit-I : Introduction and Sources of Population Data</b>	<b>10hrs</b>
History, definition, nature and scope of population Studies. Sources of population data – salient features of Census, Civil Registration System, National Sample Surveys, Demographic Surveys, relative merits and demerits of these sources. Coverage and content errors. Use of balancing equations, Chandrasekar-Deming formula to check completeness of vital registration data, use of Whipple’s, Myer’s and UN indices.	
<b>Unit-II: Fertility</b>	<b>14hrs</b>
Basic concepts and terms used in the study of fertility. Measures of fertility- Crude Birth Rate (CBR), General Fertility Rate (GFR), Age Specific Fertility Rate (ASFR), Total Fertility Rate (TFR), Birth order statistics, Child Women ratio. Measures of reproduction- Gross Reproduction Rate (GRR) and Net Reproduction rate (NRR). Measurement of population growth rate- simple growth rate and compound growth.	
<b>Unit-III: Mortality</b>	<b>11hrs</b>
Basic concepts and terms used in the study of mortality. Measures of mortality- Crude Death Rate (CDR), Age Specific Death Rate (ASDR), Direct and Indirect Standardized Death rates, Infant Mortality Rate (IMR), Under-five mortality rate, Neo-natal mortality rate, Post-natal mortality rate; Maternal Mortality Rate (MMR).	
<b>Unit-IV: Life tables and Population change</b>	<b>10 hrs</b>
Life tables: Components of a life table, force of mortality and expectation of life table, types of life tables. Construction of life tables using Reed-Merrell’s method, Greville’s method. Uses of life tables.  Basic concepts and definition of population change, migration. Types of migration- internal and international, factors affecting migration. Rates and ratios of Migration- Indirect measures of net-internal migration, national growth rate method, residual method, push-pull factors Population estimates and projections.	

**Books for References: .**

1. Barclay,G,W(1968).TechniquesofPopulationAnalysis,JohnWileyandSons,Incs. New York/London.
2. Keyfitz,H(1968). IntroductiontotheMathematicsofPopulation.Addison-WesleyPublishingCo.
3. Pathak,K.B andRam,F(1991).TechniquesofDemographicAnalysis,Himalaya PublishingHouse.
4. Ramakumar.R(1986).TechnicalDemography,WileyEasternLtd.
5. Srinivasan.K(1998).BasicDemographicTechniquesandApplications,SagePublication, New Delhi.
6. WunschG.J.&M.G.Tarmota(1978).Introduction to DemographicAnalysis,PlenumPress,N.Y.

## Skill-1: DATA ANALYSIS WITH SPSS

<b>Title Of The Paper: Data Analysis With SPSS</b>	<b>Total Marks: TH-40+ IA-10=50</b>
<b>Paper code: BSCSTAT-S1</b>	<b>TeachingHours:35 Hours</b>
<b>Teaching Hours: 3 Hours/Week</b>	<b>Credits:02</b>

Course Outcome (CO):

After the completion of this course, students will be able to:

CO 1 : Use SPSS software for cleaning and presentation of data.

CO 2 : Present the data in the form of diagrams and graphs.

CO 3 : Analyze univariate, bivariate and multivariate data.

<b>Unit-I : Introduction</b>	<b>10hrs</b>
Need of SPSS, preparation of coding sheet of the questionnaire, defining the type of variable and data, constructing the database – defining variable name, type of variable, width of variable name, labeling, assigning the numeric value to the characteristic, declare measurement of scale of data. Data Editing in SPSS: Enter the data based on type of data case wise for different variables, defining the grouping of variable for repeated measures. transforming the data into same variable and different variable,	
<b>Unit-II: Tabulation and Graphical representation</b>	<b>10hrs</b>
Formation of frequency distribution, representation of frequency distribution by graphs, construction cross table, P-P plots and Q-Q Plot.	
<b>Unit-III: Univariate, Bivariate and multivariate Data analysis</b>	<b>15 hrs</b>
Calculation of Measures of central tendency, Dispersion, Karl-Pearson’s correlation, Regression, fitting different curves difference of means for independent samples,	

### Books for References:

1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig (2007). Introduction to Mathematical Statistics, Pearson Education, Asia.
2. Irwin Miller and Marylees Miller, John E. Freunds (2006). Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia.
3. Sheldon Ross (2007). Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint.
4. Gardener, M (2012). Beginning R: The Statistical Programming Language, Wiley Publications.
5. Cunningham, B.J (2012). Using SPSS: An Interactive Hands-on approach.

### Practical Examination

Duration: 3Hrs

- Practical Examination -30 Marks
- Viva Voce -05 Marks
- Record /Journal -05 Marks

**Total -40 Marks**

### Internal Assessment for Practical Paper

- Attendance - 05 Marks
  - Test - 05 Marks
- Total - 10 Marks**

# Rani Channamma University, Belagavi

## Question Paper Pattern of UG Statistics

### Major Theory T3 and T4

**Time: 3 Hours**

**Max Marks : 80**

#### PART-A

I. Answer any **10** questions

2X10=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

#### PART-B

II. Answer any **4** questions

4X5=20

- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

#### PART-C

III. Answer any **4** questions

4X10=40

- 19.
- 20.
- 21.
- 22.
- 23.
- 24.

**Rani Channamma University, Belagavi**  
**Question Paper Pattern of UG Statistics**  
**Elective Theory E1, E2 and Skill-2**

**Time: 2 Hours**

**Max Marks : 40**

PART-A

I. Answer any **10** questions

2X5=10

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

PART-B

II. Answer any **6** questions

6X5=30

- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.

# **RANI CHANNAMMA UNIVERSITY, BELAGAVI**



## **BACHELOR OF SCIENCE PROGRAMME THE COURSES STRUCTURE & SYLLABUS**

**FOR**

**STATISTICS**

**V and VI Semesters**

**w.e.f.**

**Academic Year 2026-27 and Onwards Under**

**STATE EDUCATION POLICY (SEP)**

## B.Sc. Program V Semester

Category	Course Code	Title of the Paper	Marks			Teaching Hours Per Week			Credits	Duration of Exam
			IA	SEE	Total	L	T	P		
Major 1	---	Major Subject 1 (P-I)	20	80	100	4	--	--	3	3
		Major Subject 1 (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
Major 2	----	Major Subject 2 (P-I)	20	80	100	4	--	--	3	3
		Major Subject 2 (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
Major 3	---	Time Series, Index Number and Statistical Quality Control(P-I)	20	80	100	4	--	--	3	3
	---	ANOVA and Designs of Experiments (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
	---	Skill-II	10	40	50	--	--	4	2	3
	----	<b>Total Marks</b>			<b>750</b>	<b>Semester Credits</b>			<b>26</b>	

## B.Sc. Program VI Semester

Category	Course Code	Title of the Paper	Marks			Teaching Hours Per Week			Credits	Duration of Exam
			IA	SEE	Total	L	T	P		
Major 1	---	Major Subject 1 (P-I)	20	80	100	4	--	--	3	3
		Major Subject 1 (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
Major 2	----	Major Subject 2 (P-I)	20	80	100	4	--	--	3	3
		Major Subject 2 (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
Major 3	---	Vital Statistics and Econometrics (P-I)	20	80	100	4	--	--	3	3
	---	Operations Research (P-II)	20	80	100	4	--	--	3	3
	---	Practical	10	40	50	--	--	4	2	3
	---	Skill-III	10	40	50	--	--	4	2	3
	----	<b>Total Marks</b>			<b>750</b>	<b>Semester Credits</b>			<b>26</b>	

# **Regulations and Syllabus**

## **For**

## **STATISTICS**

## **In**

## **Three Year B. Sc. Course**

### **Regulation and Scheme of Instructions:**

Regulations for governing three years semesterized Bachelor degree Programme of Rani Channamma University, Belagavi in Statistics major subject with effect from academic year 2026-2027.

### **I. Goals and Objectives:**

The following aims have been kept in view while designing the syllabus of Bachelor's programme (B.Sc.) in Statistics as one of the major subject.

1. To create an aptitude and bring statistical awareness among the students.
2. To train promising learners to teach Statistics effectively at various level in the educational institutions.
3. To provide adequate Statistical knowledge and skills as required for the competitive examination.
4. To enrich and enhance analytical skill through Statistical techniques.
5. To make the subject student friendly, socially relevant and to cultivate research culture among the students.

### **II. Admission criteria:**

Any candidate who have passed PUC/10+2 with any subjects are eligible to choose Statistics as one of the major subject at the under graduate course. The other rules for admission are as per the university and government notifications from time to time.

### **III. Medium of Instruction:**

The medium of instruction will be in English.

#### **IV. Attendance:**

A minimum of 75% of attendance in each semester is compulsory.

#### **V. Scheme of Instruction:**

1. The M.A/M.Sc./M.Stat. Master degree holders in Statistics can only teach Statistics major subject at UG level.
2. Statistics is an major subject at UG level which consists of six semesters. There will be one theory paper for 100 marks and one practical paper for 50 marks each semester. The duration of teaching hours will be 4 hours per week for theory paper and 4 hours for practical.

#### **VI. General Pattern of Theory Question Paper:**

1. Theory course shall carry 100 marks of which 80 marks allotted for semester end examination and 20 marks for internal assessment.
2. Practical shall carry 50 marks of which 40 marks allotted for semester end examination and 10 marks for practical internal.

## B.SC. V SEMESTER

### Paper I: Time Series, Index Number and Statistical Quality Control

MAX.MARKS:100(SEC-80+ IA– 20)

Credits: 3

Teaching Hours: 52Hours

WL/ WEEK:04Hours

**Course Outcomes(COs):**At the end of the course the student should be able to:

- Know the components and need for Time series
- Understand the different methods of studying trend and Seasonal Index.
- Forecasting future values.
- Understand the Price and Quantity Index numbers and their different measures,
- Understand the applicability of cost of living Index number.
- Learn about process control and product control, different limits and causes of variation.
- Understand control chart for variables and attributes.
- Know the acceptance sampling plans

#### Unit – I:

**Time Series:** Meaning and definition of Time series, Uses, components of time series. Measurement of Time series – Graphical, semi- average , moving averages (3, 4 and 5 yearly), methods of least square (Straight line , Quadratic and Link relative methods)

13 hrs

#### Unit – II

**Index Numbers:** Meaning and definition, types- Price, Quantity and Value index. Uses and limitations of index numbers, Steps construction of Index numbers, methods of Index numbers – Un-weighted and weighted prices ( Laspeyre's, paasche's, Bowley's, Marshall.- Edgeworth , Fisher's ) and quantities. Test for Index numbers- TRT and FRT, Circular test. Consumer price Index Numbers.

13 hr

#### Unit – III

**Introduction on SQC:** Meaning and definition of quality, quality assurance and management. Aims and objectives of statistical process control, chance and assignable causes of variation.  $3\text{-}\sigma$  limits, warning limits and probability limits. Construction of Control charts for variables,  $\bar{X}$  and R charts with its interpretation.

13 hrs

#### UNIT – IV

**Control charts for Attributes:** Construction of Control charts for attributes P-chart, np-chart, C-chart and U-chart and their interpretations. Product control, Acceptance sampling plan – single and double sampling for attributes.

13 hrs

**Books for study:**

1. S.P.Gupta and V. K Kapoor: Fundamentals of Mathematical Statistics; Sultan Chand & Co.
2. S.P.Gupta and V. K Kapoor: Fundamentals of Applied Statistics; Sultan Chand & Co.
3. Grant,E.L. and Leaven worth,R.S(1988):Statistical Quality Control,6th edition,McGraw Hill
4. Gupta R.C.: Statistical Quality Control, - Khanna Pub.Co.
5. Montgomery, C.D. (1999): Introduction to Statistical Quality Control, Wiley Int.Edn.

# B.Sc. – V SEMESTER

## Paper II : ANOVA and Design of Experiments

**MAX. MARKS: 100 (Theory - 80 + IA – 20)**

**Credits:3**

**Teaching Hours: 52 Hours**

**WL/ WEEK: 04Hours**

**Course Outcomes(COs):**At the end of the course the student should be able to:

- Understanding one way and two way ANOVA
- Applying ANOVA to compare means across groups.
- Check assumptions: Normality and homogeneity of variance.
- Understanding concepts Randomization, Replication and Local control
- Apply the principles of Design of Experiment to generate experimental designs.
- Develop problem solving skills for the application of Design of experiments to Agriculture and laboratory experiments.

### Unit – I

**ANOVA:** Meaning and assumptions. Chance and assignable causes, objectives. Analysis of variance (fixed effects model) - Analysis of one-way, two-way classified data, expectation of mean sum of squares, preparation of ANOVA tables. Least significant difference. Case of multiple but equal number of observations per cell in two-way classification (with interaction).

**13 hrs**

### Unit- II

**Design of Experiments:** Meaning, definition, Principles of design of experiments. Completely randomized (CRD), Randomized block (RBD) - layout, modules and formation and the analysis using fixed effect models. Least square estimates of parameters, hypothesis and test procedure. Efficiency of RBD over CRD. Missing observations in RBD.

**15 hrs**

### Unit - III

**Latin Square Design:** Meaning, definition, Layout of LSD and analysis of LSD. Least square estimates of parameters, hypothesis, test procedure and ANOVA table Estimation of single missing observation in LSD and Relative efficiency, Merits and demerits.

**12 hrs**

### Unit -IV

**Factorial Experiments:** Meaning, definition of factorial experiments,  $2^2$  and  $2^3$  – factorial experiment. Main effects and interactions, their best estimates and orthogonal contrasts. Yates methods of computing factorial effects .Total, partial confounding with RBD layout. ANOVA tables, brief knowledge on confounding

**13 hrs**

**Books for study:**

1. Cochran.W.G. andG.M.Cox: Experimental Designs-John Wiley.
2. Goon A.M et.al: Fundamentals of Statistics, Vol. II- World Press, Calcutta.
3. Gupta S.C and VK Kapoor: Fundamentals of Applied Statistics- Sultan Chand & Sons.
4. Montgomery.D.C: Design and analysis of experiments: Wiley

**Books for Reference:**

1. Das M.N. and Giri.N: Design of Experiments: Theory and Applications.
2. Joshi.D.D.Linear estimation and Design of Experiments: New-Age International.

## **B.Sc. – V SEMESTER Practical**

**MAX. MARKS: 50 (SEC- 40 + IA – 10)**

**Credits:2**

**WL/ WEEK: 04Hours**

### **List of Practical:**

1. Times Series – I
2. Times Series – II
3. Index Number – I
4. Index Numbers – II
5. Construction of  $\bar{X}$  and R charts.
6. Construction of  $C$  and  $U$  - charts.
7. ANOVA (One way & Two way)
8. CRD & RBD
9. Estimation of missing value in RBD & LSD and Analysis
10. Factorial Experiments  $2^2$  &  $2^3$

## **B.Sc. – V SEMESTER**

### **SKILL-I Practicals**

**MAX. MARKS: 50 (SEC- 40 + IA – 10)**

**Credits:2**

**WL/ WEEK: 04Hours**

#### **List of Practical:**

1. Times Series
2. Consumer Price Index
3. Construction of  $P$  and  $np$  charts.
4. Design of Experiments
5. Efficiency of Design

**B.Sc.-VI SEMESTER**  
**Paper – 1 :Vital Statistics and Econometrics**

**MAX. MARKS: 100 (Theory - 80 + IA – 20)**

**Credits:3**

**Teaching Hours: 52 Hours**

**WL/ WEEK: 04Hours**

**Course Outcomes(COs):**At the end of the course the student should be able to:

- Acquire knowledge about the size, composition, organization and distribution of the population
- Understanding measures of fertility, mortality and reproduction rates
- Calculating and interpreting birth rates and ratios
- Applying demographic techniques for population projections
- Acquire knowledge about the construction of life table and its applications in demographic analysis
- Understand the basic concepts and scope of econometrics in economic analysis
- Apply simple and multiple regression models to real world
- Test economic hypotheses using appropriate econometric techniques

**Unit - I**

**Vital statistics – I:** Meaning and definition of Vital statistics, Sources of Vital statistics, uses and measurement of population. Measurement of Fertility Rates : Crude, Age specific, General and Total fertility rates. Merits and its demerits

**13 hrs**

**Unit – II**

**Vital statistics – II:** Measurement of Mortality Rates: Crude, Specific and Standardized death rate, Infant mortality rate, Neonatal mortality rate and maternal mortality rates merits and demerits. Reproduction rates - Gross reproduction and Net reproduction. Scope and contents of Population census of India, population census methods, economic census. Highlights of last population census.

**13 hrs**

**Unit – III**

**Life table:** Meaning, definition and uses of life table, components of life table and its computations - Explanation of the columns of life table. Types of life table, Construction of life table by – Reed merrell’s method , Greville’s method

**13 hrs**

**Unit - IV**

**Econometrics:** Origin, meaning, definition, methodology, scope and limitations. Objective behind building econometric models, nature of econometrics, model building, role of econometrics, structural and reduced forms. General linear model (GLM). Estimation under linear restrictions.

**13 hrs**

**Books for study:**

1. Mukhopadhyay. P (2015): Applied Statistics, Books and Allied (P) Ltd., Kolkata.
2. Goon A.M et.al: Fundamentals of Statistics, Vol. II- World Press, Calcutta.
3. Gupta S.C and VK Kapoor: Fundamentals of Applied Statistics- Sultan Chand & Sons.
4. GMK Madnani :Introduction to Econometrics principles and applications
5. Damodar N. Gujarati and Dawn C. Porter: Basic Econometrics

# B.Sc.-VI SEMESTER

## Paper – II : Operation Research

**MAX. MARKS: 100 (Theory - 80 + IA – 20)**

**Credits: 3**

**Teaching Hours: 52 Hours**

**WL/ WEEK: 04Hours**

**Course Outcomes(COs):**At the end of the course the student should be able to:

- Formulate a linear programming problem
- Solve linear programming problem for optimal solution
- Understanding the transportation problem formulation
- Solve transportation problems and give the optimal solution.
- Understanding the assignment problem and its applications
- Solve assignment problems and give the optimal solution.
- Analyzing 2-player zero- sum games and mixed strategies
- Solve game problems using different techniques.

### Unit -I

**Linear Programming Problem (LPP):** Origin, growth, development of O.R. Definition and Scope of Operations Research (OR). Definition, Basic Concepts and Formulation of an LPP. Mathematical form of general LPP, Standard LPP, Slack, Surplus and artificial variables, Feasible solution, Basic feasible solution, Optimum solution. Graphical solution. Simplex method, Big-M Method and its Examples.

**13 hrs**

### Unit – II

**Transportation problem:** Meaning, Definition and mathematical form of TP, feasible solution, basic feasible solution, Optimum solution. Methods of finding BFS: North-west corner rule (NWCR), matrix minima method (MMM), and Unit cost penalty method (Vogel's approximation method VAM). Method of finding optimum solution to a TP, merits and demerits, Unbalanced TP. Simple problems.

**13hrs**

### Unit – III

**Assignment problem:** Meaning, Definition and mathematical formulation of assignment problem, procedure of solving assignment problem. Simple problems. The travelling salesman problem. Un-balanced Assignment Problems.

**13hrs**

### Unit – IV

**Game Theory:** Meaning, definition of game theory, scope, basic terms in game theory Rectangle game, Minimax - Maximin principle, solution to rectangular game using, dominance and modified dominance property to reduce the game matrix. Graphical method.

**13 hrs**

**Reference Books :**

1. Kantiswaroop, Man Mohan and P.K Gupta (2003): Operations Research-Sultan Chand & Co.
2. Churchman C.W, Ackoff R.L and Arnoff E.L (1957): Introduction to Operations Research - John Wiley.
3. Shenoy,G.V. ,Srivatsava,U.K and Sharma,S.C.: Operations Research for Management,  
New Age Int.
4. Operations Research: S. Kalavathy

**Books for study:**

- 1 Operations Research Methods and Practice- New age Publication
2. Mittal K.V: Optimization Method- New age Publication
3. Kapoor V.K: Operations Research- Sultan Chand & Co.
4. Narag,A.S..Linear Programming and Decision making. - Sultan Chand & Co.

## **B.Sc. – VI SEMESTER PRACTICAL**

**MAX. MARKS: 50 (SEC- 40 + IA – 10)**

**Credits:2**

**WL/ WEEK: 04Hours**

### **List of Practical:**

1. Vital Statistics - I (Fertility Rates)
2. Vital Statistics - II (Mortality Rates)
3. Life table - I
- 4.. Econometrics
5. Linear Programming Problem-I
6. Linear Programming Problem –II
7. Transportation problem
8. Assignment problem
9. Game Theory

## **B.Sc. – VI SEMESTER**

### **SKILL-II Practicals**

**MAX. MARKS: 50 (SEC- 40 + IA – 10)**

**Credits:2**

**WL/ WEEK: 04Hours**

#### **List of Practical :**

1. Reproductive Rates
2. Linear Programming Problem
3. Transportation problem
4. Assignment problem
5. Game Theory

### Practical Examination

Duration: 3Hrs

- Practical Examination -30 Marks
- Viva Voce -05 Marks
- Record /Journal -05 Marks

**Total -40 Marks**

### Internal Assessment for Practical Paper

- Attendance - 05 Marks
- Test - 05 Marks

**Total - 10 Marks**

## Question Paper Pattern in Statistics (Major) for all semester

1. Answer any **10** questions out of **12** questions (Q.No.1to12) 10x2=20 Marks

2. a)

b)

(5+10=15)

OR

a)

b)

(5+10= 15)

3. a)

b)

(5+10=15)

OR

a)

b)

(5+10= 15)

4. a)

b)

(5+10= 15)

OR

a)

b)

(5+10= 15)

5. a)

b)

(5+10 =15)

OR

a)

b)

(5+10 =15)

**Total=80marks**